REMARKS

The April 25, 2006 Office Action was based upon pending Claims 1-74. Claims 6, 17, 18, 24, 26, 31-41, 44-46 and 51-74 were previously withdrawn from consideration. This Amendment amends Claims 1, 7, 49 and 50. After entry of this Amendment, Claims 1-74 remain pending.

Claim Objections

In the April 25, 2006 Office Action, Claims 49 and 50 are objected to because of informalities. The Office Action states that "...an oscillator/amplifier pump optical..." is believed to more correctly read "...and oscillator/amplifier optical pump..."

To address the Examiner's concern, Claim 49 has been amended to recite "an oscillator pump that optically pumps..." Similarly, Claim 50 has been amended to recite "an amplifier pump that optically pumps..."

Withdraw of the objection to Claims 49 and 50 is therefore respectfully requested.

Claim Rejections

Claims 1-5, 9, 19-23, 25 and 27-30 are rejected under 35 U.S.C. §102(e) as being anticipated by Price, et al (U.S. Patent No. 6,813,429). Claims 7-8 and 10-16 are rejected under 35 U.S.C. §103(a) as being unpatentable over Price. Claims 42-3 and 49-50 are rejected under 35 U.S.C. §103(a) as being unpatentable over Price in view of Lin (U.S. Patent No. 6,590,910). Additionally, Claims 47-48 are rejected under 35 U.S.C. §103(a) as being unpatentable over Price in view of Lin, and further in view of Hu, et al. (U.S. Patent No. 6,901,085).

With regard to Claim 1, the Office Action states that Price discloses a pulsed fiber laser system comprising a modelocked fiber oscillator outputting optical pulses, an amplifier optically connected to the modelocked fiber oscillator to receive the optical pulses, and a variable attenuator such that the optical energy that is coupled from the modelocked fiber oscillator to the amplifier can be reduced.

With regard to Claim 9, the Office Action additionally states that Price discloses a method of producing laser pulses comprising: substantially modelocking modes of a laser cavity to produce a laser pulse, amplifying the laser pulse, chirping the laser pulse, compressing the

laser pulse to produce compressed laser pulses having a shortened temporal duration, and selectively attenuating the laser pulses to further shorten the duration of the compressed laser pulses.

Price, however, does not recite that *attenuating the optical energy* coupled from the mode-locked fiber oscillator to the amplifier *reduces the pulse width* as recited in amended Claim 1. Nor does Price teach that *selectively attenuating* the laser pulse prior to amplifying the laser pulse further *shortens the duration* of the compressed laser pulses as recited in Claim 9. Additionally, Price fails to disclose adjusting the variable attenuator based on a measurement of the optical pulses to *reduce the intensity* of the optical pulses delivered to the amplifier and *to shorten the pulse* as recited in Claim 12

Price discloses "sources of optical pulses and methods of generating optical pulses, particularly tunable pulses, by use of the soliton-self-frequency shifting effect in an optical amplifier..." (See column 1, lines 19-23.) Price teaches in column 1, line 66 to column 2, line 5, that "[f]emtosecond pulses launched in a suitable optical fiber will propagate as solitons, and Raman frequency shifting within the spectra of the individual solitons gradually alters the wavelength of the pulses. The amount of alteration, or tuning, is governed by factors including pulse power, fiber material and fiber length." In Price, "...tunability can be achieved by varying the power of pump light provided to the amplifier." (See abstract). In particular, see column 6, lines 45-50, which states that

> "[B]y altering a number of parameters, such as the length of the fiber, or the power of the pulses as they are launched into the fiber, it is possible to change the final wavelength to which the pulses are shifted. Thus, a tunable system can be achieved."

In contrast, nowhere does Price teaches that varying the power of the optical pulses, and in particular, attenuating the laser pulses, shortens the pulse duration. In general, because the pulses are solitons, the pulse width would tend to remain intact as the solitons are tuned by varying pump power. If changes in the pulse duration are introduced with extreme pump attenuation, one would expect the pulses to increase (not decrease) in duration as a result of the attenuation. Accordingly, Price fails to teach shortening the pulse duration by selectively attenuating the laser pulses. Nor would this result be obvious from the teaching of Price and the

other cited art. Accordingly, Claims 1-5 and 7-16 are patentable over Price taken alone or together with the cited references.

With regard to Claim 19, the Office Action states that Price discloses a pulsed fiber laser comprising a modelocked fiber oscillator, an amplifier, and a spectral filter. The Office Action states that gratings would perform the function of a bandpass filter, only allowing for substantial reflection of the frequency regime that matches the grating pitch and dimension.

With regard to Claim 27, the Office Action states that Price discloses a method of producing compressed optical pulses comprising substantially modelocking longitudinal modes of a fiber cavity so as to produce a train of optical pulses, amplifying the optical pulses, compressing the optical pulses, and reducing the spectral bandwidth such that the compressed optical pulses have a shorter duration.

Price, however, never discloses a spectral filter having a spectral transmission with a band edge that overlaps the spectral power distribution of the optical output of the modelocked fiber oscillator so as to attenuate a portion of the spectral power distribution and thereby reduce the spectral bandwidth as recited in Claim 19. Nor does Price disclose reducing the spectral bandwidth of the spectral power distribution as recited in Claim 27.

The assumption that a grating reduces the spectral bandwidth of the optical pulse is erroneous. One cannot presume that the grating has a band edge is located so as to attenuate a portion of the spectral power distribution and reduce the spectral bandwidth. Nor can one assume that the grating has a bandwidth that is smaller than the bandwidth of the spectral power distribution of the optical pulses. Accordingly, Price does not disclose reducing the spectral bandwidth; nor would reducing the spectral bandwidth of the spectral power distribution be obvious from Price and the other cited art. Accordingly, Claims 19-23, 25, and 27-30 are patentable over Price taken alone or together with the other cited references.

With regard to Claim 42, the Office Action states that Price teaches a laser devices with a modelocked fiber oscillator, an amplifier, and a compressor but does not teach (i) an optical tap between the modelocked fiber oscillator and the amplifier, including feedback back to the fiber oscillator, and (ii) a second optical tap between the amplifier and the compressor including

feedback back to the amplifier. The Office Action further states that Lin teaches a fiber system with modelocking wherein an optical tap is set up in conjunction with a feedback loop, wherein a measurement is taken and the system is adjusted based on the measurement. The Office Action concludes that it would have been obvious to one of ordinary skill in the art to combine the teaching of pump power regulation of Price with the tap and feedback measurement and control loop of Lin in order to control the pumping sources to allow for active control of the optical pulses characteristics.

Lin, however, teaches processing to determine the difference between the actual frequency chirp of the optical pulses and a desired frequency chirp. Lin further teaches changing the phase across each pulse to reduce the chirp error. As a result the chirp of each pulse is locked to the desired chirp. See column 5, lines 23-41.

Accordingly, the combination of Price and Lin, does not disclose the claimed invention. For example, the combination of Price and Lin, do not teach first and second optical loops. Nor, do Price and Lin together teach a first optical tap between a modelocked fiber oscillator and a fiber amplifier and a second optical tap between the fiber amplifier and a compressor. Additionally, the combination of Price and Lin do not disclose that the first feedback loop controls an oscillator pump (Claim 49) and the second feedback loop controls an amplifier pump (Claim 50).

Moreover, the combination of these quite specific features recited in the claims would not be obvious to one skilled in the art aware of the teaching of Price and Lin, the later teaching changing the phase across a pulse to reduce chirp error. Lin teaches a specific type of feedback system for a specific type of problem. One skilled in the art cannot be presumed to be in possession of the specific claimed features including, for example, a first tap between a modelocked fiber oscillator and a fiber amplifier and a second tap between a fiber amplifier and a compressor and a first feedback loop from the first tap to the modelocked oscillator and a second feedback loop from the second loop to the amplifier based on the remote specific teachings of Lin regarding reducing phase error. Nor would controlling the oscillator pump and amplifier pump be obvious from the teaching regarding phase locking in Lin.

Although the Office Action generalizes the teaching of Lin, stating that Lin teaches broadly an optical tap is set up in conjunction with a feedback loop, wherein a measurement is

taken and the system is adjusted based on the measurement, such broad concepts are also not enough to make obvious the very specific features recited in the claims.

Claims 42, 43 and 47-50 are therefore patentable over Price and Lin taken alone or together with the other cited references.

CONCLUSION

Applicants have endeavored to address all of the Examiner's concerns as expressed in the outstanding Office Action. In light of the above remarks, reconsideration and withdrawal of the outstanding rejections is specifically requested.

Respectfully submitted,

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